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**Dr. Raymond W. Waldo**
Vice President - Nuclear
San Onofre

August 17, 2007

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **Docket No. 50-361**
**Licensee Event Reports Nos. 2007-001 and 2007-002**
**San Onofre Nuclear Generating Station, Unit 2**

Dear Sir or Madam:

On June 20, 2007, San Onofre Nuclear Generating Station (SONGS) Unit 2 Instrument Air System failed and Operators manually tripped the reactor. This letter provides two Licensee Event Reports (LER) associated with this event. The LER 2007-001 discusses the Instrument Air system failure and reactor trip. The LER 2007-002 discusses a separate Technical Specification violation that occurred following that reactor shutdown. This event did not affect the health and safety of either plant personnel or the public.

If you require any additional information, please contact me.

Sincerely,
Raymond Waldo

Unit 2 LER No. 2007-001
Unit 2 LER No. 2007-002

cc: B. S. Mallett, NRC Regional Administrator, Region IV
C. C. Osterholtz, NRC Senior Resident Inspector, San Onofre Units 2 & 3

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NRR

NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

# LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

| 1. FACILITY NAME | 2. DOCKET NUMBER | 3. PAGE |
|---|---|---|
| San Onofre Nuclear Generating Station (SONGS) Unit 2 | 05000361 | 1 OF 3 |

4. TITLE

## Instrument Air system failure results in Manual Reactor Trip

| 5. EVENT DATE | | | 6. LER NUMBER | | | 7. REPORT DATE | | | 8. OTHER FACILITIES INVOLVED | |
|---|---|---|---|---|---|---|---|---|---|---|
| MO | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REV NO | MO | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| | | | | | | | | | None | |
| 6 | 20 | 2007 | 2007-001-00 | | | 08 | 17 | 2007 | FACILITY NAME | DOCKET NUMBER |
| | | | | | | | | | | |

| 9. OPERATING MODE | 1 |
|---|---|
| 10. POWER LEVEL | 96 |

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR : (Check all that apply)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 20.2201(b) | | 20.2203(a)(3)(ii) | | 50.73(a)(2)(ii)(B) | | 50.73(a)(2)(ix)(A) |
| | 20.2201(d) | | 20.2203(a)(4) | | 50.73(a)(2)(iii) | | 50.73(a)(2)(x) |
| | 20.2203(a)(1) | | 50.36(c)(1)(i)(A) | X | 50.73(a)(2)(iv)(A) | | 73.71(a)(4) |
| | 20.2203(a)(2)(i) | | 50.36(c)(1)(ii)(A) | | 50.73(a)(2)(v)(A) | | 73.71(a)(5) |
| | 20.2203(a)(2)(ii) | | 50.36(c)(2) | | 50.73(a)(2)(v)(B) | | OTHER |
| | 20.2203(a)(2)(iii) | | 50.46(a)(3)(ii) | | 50.73(a)(2)(v)(C) | | Specify in Abstract below or in NRC Form 366A |
| | 20.2203(a)(2)(iv) | | 50.73(a)(2)(i)(A) | | 50.73(a)(2)(v)(D) | | |
| | 20.2203(a)(2)(v) | | 50.73(a)(2)(i)(B) | | 50.73(a)(2)(vii) | | |
| | 20.2203(a)(2)(vi) | | 50.73(a)(2)(i)(C) | | 50.73(a)(2)(viii)(A) | | |
| | 20.2203(a)(3)(i) | | 50.73(a)(2)(ii)(A) | | 50.73(a)(2)(viii)(B) | | |

12. LICENSEE CONTACT FOR THIS LER

| NAME | TELEPHONE NUMBER (Include Area Code) |
|---|---|
| R. W. Waldo, VP Generation | 949-368-8725 |

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

| CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX | | CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |

| 14. SUPPLEMENTAL REPORT EXPECTED | | | | 15. EXPECTED SUBMISSION DATE | MONTH | DAY | YEAR |
|---|---|---|---|---|---|---|---|
| | YES (If yes, complete EXPECTED SUBMISSION DATE) | X | NO | | | | |


**16. ABSTRACT** (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On June 20, 2007, at about 2240 PDT, Unit 2 was operating in Mode 1 at about 96 percent power when a line in the instrument air system separated at a soldered connection. The resulting loss of Instrument Air (IA) pressure caused the loss of control of the Steam Generator Feedwater Regulating valves. One steam generator level rose uncontrolled necessitating the control room Operators to trip the reactor manually at about 2250 PDT, June 20, 2007. Operators subsequently manually tripped the Main Feedwater pumps to stop excess feedwater to the steam generators and actuated the Auxiliary Feedwater System. As designed, loss of IA system pressure isolates cooling water to the normal containment coolers and Operators manually started the Containment Emergency Cooling Units as a conservative measure.

Southern California Edison(SCE) reported this occurrence to the NRC Operations Center at 0024 PDT on June 21, 2007 (NRC Event Log Number 43435). SCE is providing this follow-up written report in accordance with 10CFR50.73(a)(2)(iv)(A).

The soldered connection failed due to improper fit and slow acting corrosion. SCE inspected the IA system piping and installed pipe clamps to strengthen piping joints where needed to add additional margin.

Plant: San Onofre Nuclear Generating Station (SONGS) Unit 2
Discovery Date: June 20, 2007
Reactor Vendor: Combustion Engineering
Mode: Mode 1 – Power Operation
Power: 96 percent

**Background**

San Onofre Units 2 and 3 share a common instrument air (IA) [LD] system that pneumatically operates components in the plant. The IA system was designed as a Quality Class III (non-safety-related) system and is necessary for plant startup and power operation. Safety Related Equipment supplied by the IA system is designed to fail to their safety function positions on a loss of air pressure. This design allows a non-safety-related system to support safety-related components.

The IA system is provided with three 100 percent capacity air compressors powered from different power supplies. The IA system can be supplemented with air from Service Air [LF] and an independent backup nitrogen supply in case of system failure. Although the IA system is common to both Units 2 and 3, check valves isolate the unit with a break when a high change in pressure occurs. Capacity of the IA system is such that normal system operation could continue with a break in a 1" or smaller IA line.

**Description of Event**

On June 20, 2007, at 2240 PDT, Unit 2 was operating in Mode 1 at about 96 percent power when a 3" diameter copper line in the instrument air system separated at a soldered connection joint. The loss of Instrument Air pressure caused the feedwater bypass valves to close. The resulting decrease in steam generator levels caused the controller to increase the speed (flow) of the main feedwater pumps. Due to the differences in the positions of the Main Feedwater Regulating valves that lock as-is on loss of instrument air, the steam generators filled unequally. When Steam Generator E088 level reached about 85 percent, the Control Room Operators tripped the reactor. Operators subsequently manually tripped the Main Feedwater pumps to stop excess feedwater to the steam generators and actuated the Auxiliary Feedwater System. Operators manually initiated the Emergency Feedwater Actuation Signals [JE] to start the Auxiliary Feedwater System [SA]. As designed, the loss of IA system pressure also resulted in the isolation of cooling water to the normal containment coolers. Therefore, operators manually started the Containment Emergency Cooling Units as a conservative measure.

The IA back-up system and check valves sustained IA service to Unit 3 until the break could be completely isolated.

Southern California Edison reported this occurrence to the NRC Operations Center at 0024 PDT on June 21, 2007 (NRC Event Log Number 43435), in accordance with 10CFR50.72(b)(2)(iv)(B) for actuation or the Reactor Protection System, and 50.72(b)(3)(iv)(A) for valid actuation of the Emergency Feedwater and Containment Emergency Cooling Unit. SCE is providing this follow-up written report in accordance with 10CFR50.73(a)(2)(iv)(A).

### Cause of Event

The cause of this event is loss of instrument air system pressure when the instrument air system separated at a soldered connection in a section of 3" diameter piping. The connection failed because (1) a weak solder joint, and (2) corrosion of the solder joint.

This section of pipe and the failed solder joint were installed during original plant construction (~1980). The solder connection was weak because the gap between the tube and the coupling was too large. The larger gap did not allow for the capillary action necessary to provide an even distribution of the melted solder and the solder pooled at the bottom of the coupling. The larger gap also allowed solder flux to remain in the solder, which lead to slow acting corrosion of the solder joint. When corrosion had sufficiently reduced the solder joint strength, the connection separated.

### Corrective Actions

- SCE replaced the Instrument Air solder joint that had separated and the leaking joint adjoining it.
- SCE inspected all soldered joints on piping greater than one inch in the IA system on Units 2 and 3 (approximately 818 joints). Thirty-two (32) clamps were installed on joints indicating leakage to add additional margin.
- SCE identified the other system containing solder joints at SONGS (Domestic Water System, up to 6" diameter). Given that there is no indication of water leakage, SCE concluded that Domestic Water System can be eliminated from the Extent of Condition scope.

Additional corrective actions will be implemented in accordance with SONGS Corrective Action Program.

### Safety Significance

The Instrument air system is a non-safety-related system. Safety Related Equipment supplied by the IA system are designed to fail to their safety function position on a loss of air pressure. In response to this manual reactor trip reported in this LER, plant equipment responded as required. This occurrence remained bounded by the Updated Final Safety Analysis Report evaluation of a loss of instrument air event and did not affect the health and safety of either plant personnel or the public.

### Additional Information:

During this event, there was a separate Technical Specification violation described in LER 2007-002.

In the past three years, there have been no other occurrences of a failed solder connection resulting in a reactor trip.

NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

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|---|---|---|
| San Onofre Nuclear Generating Station (SONGS) Unit 2 | 05000361 | 1 OF 3 |

4. TITLE

## Operator error results in a missed shutdown margin verification required by the Technical Specifications

| 5. EVENT DATE | | | 6. LER NUMBER | | | 7. REPORT DATE | | | 8. OTHER FACILITIES INVOLVED | |
|---|---|---|---|---|---|---|---|---|---|---|
| MO | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REV NO | MO | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| | | | | | | | | | None | |
| 6 | 21 | 2007 | 2007-002-00 | | | 08 | 17 | 2007 | FACILITY NAME | DOCKET NUMBER |

| 9. OPERATING MODE | 1 |
|---|---|
| 10. POWER LEVEL | 96 |

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR ': (Check all that apply)

| | | | |
|---|---|---|---|
| 20.2201(b) | 20.2203(a)(3)(ii) | 50.73(a)(2)(ii)(B) | 50.73(a)(2)(ix)(A) |
| 20.2201(d) | 20.2203(a)(4) | 50.73(a)(2)(iii) | 50.73(a)(2)(x) |
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| 20.2203(a)(2)(i) | 50.36(c)(1)(ii)(A) | 50.73(a)(2)(v)(A) | 73.71(a)(5) |
| 20.2203(a)(2)(ii) | 50.36(c)(2) | 50.73(a)(2)(v)(B) | OTHER Specify in Abstract below or in NRC Form 366A |
| 20.2203(a)(2)(iii) | 50.46(a)(3)(ii) | 50.73(a)(2)(v)(C) | |
| 20.2203(a)(2)(iv) | 50.73(a)(2)(i)(A) | 50.73(a)(2)(v)(D) | |
| 20.2203(a)(2)(v) | X 50.73(a)(2)(i)(B) | 50.73(a)(2)(vii) | |
| 20.2203(a)(2)(vi) | 50.73(a)(2)(i)(C) | 50.73(a)(2)(viii)(A) | |
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| CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

| 14. SUPPLEMENTAL REPORT EXPECTED | | | 15. EXPECTED SUBMISSION DATE | MONTH | DAY | YEAR |
|---|---|---|---|---|---|---|
| YES (If yes, complete EXPECTED SUBMISSION DATE) | X | NO | | | | |


**16. ABSTRACT** (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On June 20, 2007, Unit 2 was operating in Mode 1 at about 96 percent power. At about 1030 PDT, one channel of source range monitoring did not pass its surveillance requirements and was declared inoperable. Consistent with plant procedures, Operators placed a Limiting Condition for Operation Action Requirements/Equipment Deficiency Mode Restraint (LCOAR/EDMR) tag next to the channel indicator (the channel indicator continued to function).

At about 2240 PDT the same day, a line in the instrument air system separated at a soldered connection joint. Plant Operators manually tripped the unit, entering Mode 3. The details of that event are provided in LER 2-2007-001.

When completing the post trip actions required by Emergency Operating Instructions, a control room operator failed to notice that one channel of source range monitoring channels was out of service and failed to complete the Shutdown Margin verification by 0250 PDT, June 21, 2007, required by Technical Specification 3.3.13, Action A.2. SCE is reporting this occurrence in accordance with 10CFR50.73(a)(2)(i)(B).

The cause of this event is individual personal error. The Reactor Operator (RO) failed to respond to the LCOAR/EDMR tag posted next to the Startup Channel indicator. Southern California Edison has coached the Operator and discussed this event with all other Licensed Operators.

Plant: San Onofre Nuclear Generating Station (SONGS) Unit 2
Discovery Date: June 21, 2007
Reactor Vendor: Combustion Engineering
Mode: Mode 1 – Power Operation
Power: 96 percent

**Description of Event:**

Technical Specification (TS) 3.3.13, Source Range Monitoring Channels, requires two channels of source range monitoring to be operable. This specification is applicable whenever the plant is in Modes 3, 4, and 5, with the reactor trip breakers open or control element assembly drive system not capable of CEA withdrawal. When applicable and with one source range monitor inoperable, plant operators are required to, in part, perform a Shutdown Margin (SDM) verification in accordance with Surveillance Requirement (SR) 3.1.1.2, if T(ave) is greater than 200 degrees F, or in accordance with SR 3.1.2.1, if T(ave) is less than 200 degrees F. Required Action A.2 of TS 3.3.13 has a required completion time of 4 hours after entering an applicable plant condition and once every 12 hours thereafter.

On June 20, 2007, Unit 2 was operating in Mode 1 at about 96 percent power. At about 1030 PDT, one channel of source range monitoring did not pass its surveillance requirements and was declared inoperable. Consistent with plant procedures, Operators placed a Limiting Condition for Operation Action Requirements/Equipment Deficiency Mode Restraint (LCOAR/EDMR) tag next to the channel indicator (the channel indicator continued to function).

On June 20, 2007, at about 2240 PDT, Unit 2 was operating in Mode 1 at about 96 percent power when a line in the instrument air system separated at a soldered connection joint. Operators manually tripped the unit at about 2250 PDT, June 20, 2007. The details of that event are provided in LER 2007-001.

When operators manually tripped the reactor, the plant entered Mode 3 and entered the applicability of TS 3.3.13. When completing the post trip actions required by Emergency Operating Instructions (EOI), a control room operator failed to notice that one channel of source range monitoring channels was out of service and failed to complete the SDM verification by 0250 PDT, June 21, 2007, as required by TS 3.3.13, Action A.2. Southern California Edison is reporting this occurrence to the NRC in accordance with 10CFR50.73(a)(2)(i)(B).

**Cause of Event:**

The cause of the event was individual operator error. The Reactor Operator (RO) failed to correctly respond to the LCOAR/EDMR tag posted next to the Startup Channel indicator. When the RO performed the channel check required by procedure, he observed both channels indicating and did not question their operability.

**Corrective Actions:**

The Operator involved in this case has been coached on the requirement to check for LCOAR/EDMR tags when determining whether TS related components are functional. SCE also reviewed this event with all other Licensed Operators.

Additional corrective actions will be implemented if they are identified.

**Safety Significance:**

There was no safety significance to this event. At about 0830 PDT on June 21, 2007, plant operators completed the required SDM verification and confirmed the SDM satisfied the requirements of SR 3.1.1.2 [T(ave) was greater than 200 degrees F.]

**Additional Information:**

In the last three years, there have been no other reported occurrences of a missed TS required surveillance caused by failing to notice that TS required equipment was out of service.